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SCIENCE AND TECHNOLOGY

No. 68

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ELECTRONICS

INMOS 64K DYNAMIC RAM HAS 100-NANOSECOND ACCESS TIME

Paris ELECTRONIQUE INDUSTRIELLE in French 1 Jun 81 p 6

[Article by R.S.: "64K Dynamic RAM-100-Nanosecond Access Time"]

[Text] The British company, INMOS, which has concluded on agreement for representation with Tekelec, is to inctoduce, between now and year's end, a 64K dynamic RAM [rapid access memory], the INMOS 2600 which will be the fastest on the market with 100-nanosecond access time (compared with 150 nanoseconds for the fastest now on the market). This memory, samples of which will be available in July, employs N-MOS [N metal oxide semiconductor] technology with two levels of polycrystalline silicon and silicon gate with 3-micron lines. It uses a redundant scheme with two groups of columns and two groups of four supplementary rows which occupy only 5 percent of the area of the chip, which is 22 square millimeters. Like the Mostek and Motorola memories the IMS 2600 has an internal renewal mode and the N°1 pin is not connected in order to provide compatability in the future with the 256 K level. External renewal is accomplished in 256 cycles every 4 milliseconds. This memory also has a "quartet" mode which makes it possible to address four bits at a time directly, with access time of 20 nanoseconds. This 64K dynamic RAM, whose access time is 100 nanoseconds, has cycle time of 150 nanoseconds; its power consumption is 300 milliwatts in operation (10 milliwatts on stand-by) and requires a +5 volt power supply. It is available in a DiL 16-pin mount conforming to the JEDEC standard.

In addition INMOS is to have available, during the third quarter, samples of a 16K static RAM arranged in 4K x 4 bits--INMOS 1420. That RAM will have access time of 35 nanoseconds. As far as the rapid static 16K RAM, the INMOS 1400, which provides maximum access times of 45 and 55 nanoseconds with operating power consumption of 600 milliwatts is concerned: it should be available at a price of $100 per 100 pieces. According to the manufacturer this rather high price is explained by the relatively low output yields despite the small size of the chip (20 square millimeters), the utilization of two redundant columns, and the absence of real competition in the marketplace. INMOS, which expects to achieve yields of 40 percent, believes the price will come down when the time is judged opportune. This memory is now being produced in the United States; between now and the end of next year it will be produced in a production unit installed in Great Britain.

11706
CSO: 3102/347

BRIEFS

GALLIUM ARSENIDE COMPONENT--Siemens now presents the first commercially available gallium arsenide (GaAs) component for wideband operation: the new CGY 21 amplifier has a frequency range of between 40 MHz and 1 GHz. According to the manufacturers, the monolithic device, with a noise factor of around 4.5 dB and an output voltage of 320 mV at 50 ohms or 400 mV at 75 ohms in accordance with DIN 45004, is superior to the best hybrid amplifiers with bipolar transistors currently available on the market. First samples and data sheets will be available to customers in the first quarter of 1981; in addition, the frequency range will shortly be increased to 2 GHz. Siemens itself manufactures the basic GaAs material for the CGY 21.2-inch diameter wafers are already being processed. The active layer is achieved by direct ion implantation, based on the technological experience gained in the production of low-noise GaAs field effect transistors, such as the CGY 11/12. This method saves time and costs and produces layers of high uniformity. Gold contacts ensure high reliability. The CGY 21 comes in a TO-5 or an SIL-9 package. [Text] [Munich DATA REPORT in English No 1, Mar 81 p 31]

CSO: 3102/353

ENERGY

SOLAR ENERGY TECHNOLOGY ADVANCES IN ITALY

Bari LA GAZZETTA DEL MEZZOGIORNO in Italian 18 Jun 81 p 14

[Article by Venanzio Traversa: "Some Interesting Experiments Aimed at Capturing Clean and Renewable Energy--Puglia Is in the Vanguard in the Long March to Solar Energy"]

[Text] There is something new from the sun today. In the search for energy alternative to that produced with fuel oil, solar energy can already contribute something today, but not much more in the next few years. But there is no need to be pessimistic, even if one considers that in the 1990's the contribution of the renewable energies (in practice, solar energy) will not be more than 1 percent of the coverage of our needs.

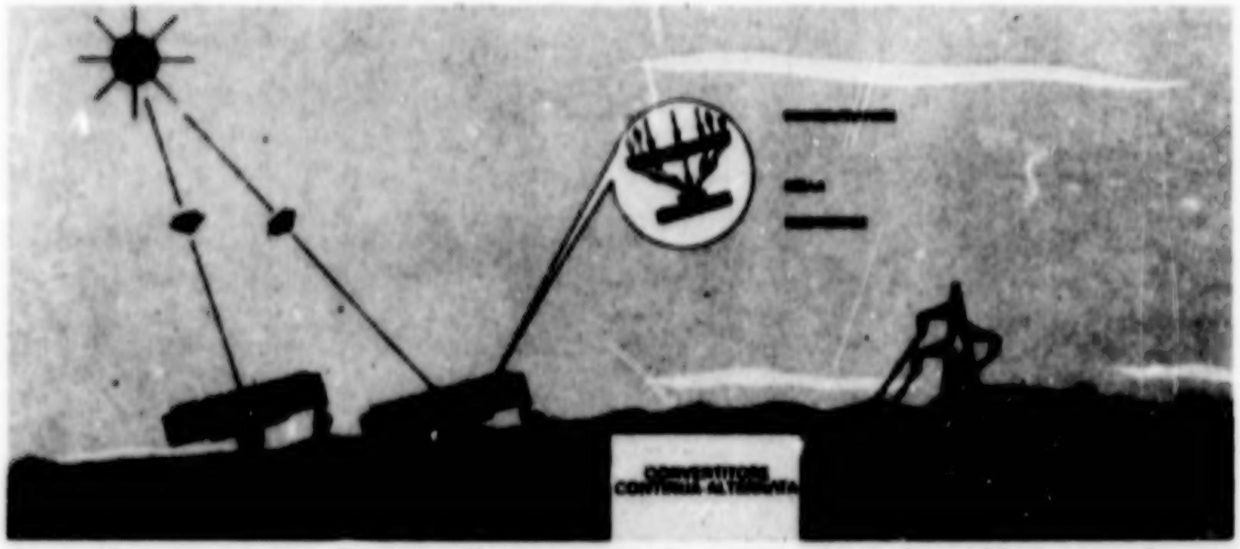
But we must go forward all the same. The road is a long one, and all uphill. A first step was taken last month with the entry into service of Europe's first solar power plant, at Adrano in Sicily: 182 enormous mirrors with a total surface area of 6,200 m^2 are oriented automatically--commanded by a central computer--to best capture the rays of the sun and transmit them to a boiler mounted on a 50-meter-high tower.

But it is a model installation that produces barely 1 megawatt, which is 1/1,000th of what the Caorso nuclear power plant will produce in full-capacity operation. But it should be stated that we are in the first experiments, which will open up the way for others. A second one has already been started in Italy on behalf of the European Community within the framework of the use of solar energy. At Ispra in Piemonte, the ESTI project--the acronym means, in English, "European Solar Test Installation"--is in operation.

The ESTI--unique in Europe at this time--is an installation that is to study the efficiency, characteristics and material of the various solar components. The activity is therefore essentially research, but of a purpose-directed type because it will offer sure data to industry, parameters on the basis of which it can then begin mass production of solar collectors, heat pumps, storage reservoirs.

Solar work is advancing slowly, bringing together in research and the building of experimental installations large industrial groups, state agencies, research bodies. In Italy, the main protagonists of this long march toward the sun as usable energy are ENEL [National Electric Power Agency], the IRI [Industrial Reconstruction Institute], FINMECCANICA [Mechanical Engineering Finance Corporation], the ENI [National Hydrocarbons Agency], the CNEN [National Nuclear Energy Commission], FIAT, the EFIM [Manufacturing Industry Holding and Financial Company], and the CNR [National Re-

The "Delphos" Power Plant in Capitanata



Here is a diagram of the "Delphos" photovoltaic power plant installed experimentally in Capitanata. The panels, with silicon cells, make it possible to transform thermal energy directly into electrical energy.

Key:

1. Concentrator	3. Dissipator
2. Cell	4. DC-AC converter

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search Council]. Apart from some inevitable duplications of competencies, which it is being attempted to eliminate, the agencies and industries are getting into specific areas of activity that fit in with their principal operational activities.

In this regard, the agreements signed by ENI and AGIP [National Italian Oil Company] with the Puglia and Toscana regions for demonstration programs should not be overlooked. In the Florence area, construction of 750 "pilot" apartments using technologies that will favor energy-saving is planned. Here in Puglia, the project for solarization of a large farm is to begin quite soon, as an experimental system in the plan to build up all the alternative energy sources.

Puglia is therefore well into solar energy--though it could not be otherwise, considering our long periods of maximum sunshine during the year and therefore the possibility of carrying out experimental programs. Indeed, going from the conventional technologies (panels, etc) to other, more advanced techniques, still in the field of solar energy, the experiment being carried out in Capitanata with the "Delphos" power plant--a joint CNEN-ENEL initiative aimed toward the building of a 1-kilowatt plant of photovoltaic type--is significant. What is involved is a transition to direct conversion of solar energy into electrical energy by means of photovoltaic cells composed of special semiconductor materials--silicon, for example. These cells, struck by solar radiation, have the property of generating electrical currents.

Right now, the principal obstacle to the photovoltaic approach is its high cost. In any case, ENEL intends to go ahead with experimentation on small power plants of between a few kilowatts and a few tens of kilowatts at most. They will be used to power light uses in zones where the costs of hook-up to the normal networks are high.

Silicon will not be the only material to be used for the photovoltaic cells. Through the CISE [expansion unknown], a research institute in which it has the major holding, ENEL is aiming toward development of high-yield cells. They are of the gallium-arsenide and aluminum type, to be coupled to concentrators. The first cells developed have produced satisfactory efficiency--about 21 percent, a value far higher than that obtained with other types, of silicon. By the end of this year, a 1-kilowatt plant of this type will be built [by?] the electric-power agency, and it will be practically the "twin" of the one in Puglia.

Our region is therefore right in the middle of the experimentation and subsequent utilization of alternative energies of renewable type. The sun is the goal line in this game. Among the less "clean" energies, nuclear power will sooner or later come among us, after the Region's decision to receive one of these power plants in our territory.

But this is a subject that we leave to others, along with all the positive and negative implications that have been dragged out for years now. Surely, without creating worries of any kind, there is one extremely comforting fact: the sun will once again serve to solve for us not only problems as old as the world but also others, by supplying energy for our domestic uses. At least at first.

11267
CSO: 3102/326

BRIEFS

MORE FUNDS FOR GASIFICATION--Support for gasification has been quadrupled. During the torment of the presidential election run-off, the former Minister of Industry, A. Gerard, signed the agreement for government financial aid relating to underground coal gasification with the GEGS (Underground Gasification Study Group). Signing of that agreement had been awaited since the responsible officials of the GEGS (Gaz de France [French Gas Co.],Charbonnages de France [French Coal Co.], Institut Français du Petrole [French Petroleum Institute], and the Bureau des Richerches Geologiques et Minieres [Geological and Mineral Exploration Bureau] announced, last 27 January, a 125-million franc program during the 1981-1984 period. The European Community will provide 40 percent of the funding, the French government 30 percent, and the GEGS partners 30 percent. This 125-million franc research effort, the Minister of Industry emphasizes, represents "a quadrupling of the preceding program." A first coal gasification experiment has already been carried out at Bruay-en-Artois. [Text] [Paris SEMAINE DE L'ENERGIE in French 25 May 81 p 10] 11706

CSO: 3102/347

INDUSTRIAL TECHNOLOGY

FRANCE'S POSITION IN MACHINE TOOL INDUSTRY ASSESSED

High-Speed, Laser Machining

Paris L'USINE NOUVELLE in French 2 Jul 81 pp 30-31

[Article by Patrick Piernaz: "Machine Tool/Robotics: Time for Technical Choices"]

[Text] Before recess ends, the authorities will examine the status of robotics and machine-tools: while there are some technological strong points, there also exist some shortcomings and serious weaknesses.

Machine-Tools: Critical Turning Point with Lasers and High-Speed Machining

The machine-tool file is in the hands of another minister of Industry. The situation is not unfamiliar to him: nearly all the major firms have registered losses, while it is imperative to make investments in order to reverse the trend in the face of foreign competition. But are there still any slots where France can compete efficiently, and does the country have the technology to do it successfully?

The experts agree on at least one point: "The effort to develop flexible shops must be sustained." The first French shops will start up at the end of 1981 for Renault Machine-Outils, and during 1982 for Ernault-Somua. Some ten others are definitely planned or are under study. Among general contractors are the major French names in machine-tools as well as some engineering firms: Automatique industrielle, CGA, Orion. For its part, the state has made the required effort: pilot lines, discounted loans, extension of the Meca [Advanced Design Machines and Equipment] procedure.

The slot is wisely chosen and the operation is off to a good start. However, it may be surprising to see so many firms starting to independently pursue the same work in a market which is surely promising but still limited. The setbacks of the French numerical control fiasco, which was settled with the emergence of a single manufacturer, should inspire caution. Many are called but few will be chosen.

At the same time, you need basic machines to build a flexible shop and France is far from meeting all its needs. While this situation is not tragic (all countries including even Germany and the United States depend on foreign countries), there are some shortcomings with heavy consequences. Two black marks: gear-cutting machines (the need for gears is fortunately diminishing with the wider use of servomotors instead of gear boxes), but especially grinders. Market requirements

World's largest aeronautic milling machine, made by TMI-Forest for the Mirage 2000 are only barely met by equipment from Constructions de Clichy, Gendron, Microrex, and SIT. Particularly for internal grinders and precision surface grinders, whose unavailability on the national market is unacceptable to major French users.

By contrast, France still holds certain strong positions. First, in milling, with heavy machines from Line and TMI-Forest. For aeronautic machining, TMI-Forest, salvaged from the wreck of the Ratier-Forest-GSP group, is technically on a par with the Americans, exports 48 percent of its production to Germany, England, and Yugoslavia, and has granted licenses to Toshiba of Japan. For precision milling, Hure Machines are found all over the world. The last orders for the Bagneux firm come from Sonay in Japan, Madison in the United States, Volvo in Sweden, and Lufthansa. Another French asset: cold-working of metals. This is true for mechanical presses which Bret and Spiertz as well as for numerical control brakes, with Colly and Promecam in particular. Promecam is even exporting its precision brakes to Boeing (40 machines sold.)

The situation is trickier for machining centers and lathes. Finding a French large-capacity machining center is no problem, but nobody can be found for small models (300 millimeters to the cube.) In the medium range the foreign competition is fierce. The new Graffenstaden line places this manufacturer in a good position, particularly for flexible shops.

For lathes as well, French builders have difficulty keeping up with Japan's mass production of NC lathes (250 a month for Moriseiki, 200 for Okuma, compared with 20 or 40 per month in France.) And Japanese manufacturers are using all possible resources: large discounts, free trips to the country of the rising sun (for faithful or undecided customers). They also have assets: complete lines, high reliability... Taken unawares, Ernault-Somua reacted energetically in April 1981 by totally discontinuing the Cholet lathes and replacing them with the inclined bed 300 to 600 series. The company has also announced it will soon introduce a revolutionary new lathe, the robot-equipped FLS with milling head and multi-axis control.

Lathe machining is currently characterized by the growing use of four-axis lathes. Manurhin, [illegible] Graffenstaden have come out with a technically advanced model. But Okuma and Yamazaki of Japan are already soliciting French customers with a fully prepared, complete catalog of machines (four models each.) At the same time, Okuma can boast of having already sold 1600 units. In France, you can count them on the fingers of one hand.

Some strong points: NC lathes with tailstocks, designed for screw machines. Manurhin has two-thirds of the European market. For the future, two other fields of opportunity seem wide open to French manufacturers: very high speed machining (TGV) and utilization of lasers. For TGV machining, France has some major assets: a magnetic-bearing spindle, and a mastery of aeronautic machining techniques. What remains to be developed is an operational machine capable of contour milling at 20 m/min and whose kinematic sequence (numerical control + motors) will be fast enough.

The Germans and the Americans have bought the French spindle. A worldwide race is on to introduce the first TGV machine. In France, TMI-Forest is at the starting line. In addition, Cermo has decided to establish a test stand to study the various types of spindles and the interactions between tools, shavings, and parts. The consequences will be very important to French machine-tooling as a whole, in terms of temperature regulation, slides, mastery of precision, or NC.

The use of lasers is another kind of challenge for the national industry. Reliable industrial lasers are now available on the market. But for these to be usable, a machine has to be constructed each time to solve a cutting problem: cardboard, cloth, glass fiber, sheet metal... Laser producers, most of them American, do not consider it their business to build custom-designed machines. Here again, there is a market to be gained. On the French side, one firm knows how to make lasers: Cilas (an affiliate of CGE). The company is preparing a line of industrial products. In addition, machine manufacturers have sensed the market. Lectra Systems in Bordeaux (pattern cutting machines for wearing apparel), and above all Claude Benedite, Laser techniques in Limoges, which has already effected several turn-key deliveries of lasers, and aims to form a French group for industrial lasers in its part of the country. In this field, research and investment will have to be supported for several years.

Playing the Robotics Card

Paris L'USINE NOUVELLE in French 2 Jul 81 pp 31-32

[Article by Michel Defaux]

[Text] There are two major groups of equipment in French robotics, each with its own problems and situation: small-arm manipulators, and industrial robots.

In the first category, national manufacturers (Afma, Climax, Sormel) are in a good position and are unquestionably influential at the European and even the world level. They have good machines, a fairly complete line, and a good standing in terms of both technology and pricing. However, they missed out on the integration of small robots into machine-tools: for the past two years in Japan, some lathes (Okuma, Ikegai) have been available from catalogs, with a loading arm whose control is integrated with the machine-tool's NC.

The second major group of equipment consists of top-of-the-line robots (priced at 200,000 to 600,000 francs). We currently use 400 of these units, of which two-thirds are imported. France got a late start and has few manufacturers (Acma, AOIP, Languepin, and Sciaky), and these often compete among themselves. In robotics, in order to have profitable research, production, and marketing teams, it is estimated that sales would have to amount to nearly 400 units per year, or roughly the annual French market. This explains the need to think in terms of the world market. The manufacturers have understood this clearly: AOIP has affiliates in England, Germany, Italy, Spain, and the United States. For its part, Acma, which is the uncontested leader in French robotics, has a captive market (for example, the Renault Douai plant which will use 100 robots for assembling the 142) and it has signed agreements with Ransburg (United States) to establish an affiliate, Cibotech.

There are currently about 50 manufacturers of advanced robots in the world. This is clearly too much for a market which has not yet clearly opened. According to Japanese experts, in 1990 there will only remain five manufacturers of international scope: at least one American and one Japanese which will be able to depend on a strong domestic market, while the other positions could be occupied by Europeans with a secure worldwide footing. On the other hand, there are opportunities to be seized in robotics applications for machine-environment use: perfecting of sensors, visualization systems, special tooling.

One of the sore points of French robotics has always been the cost of equipment. The solution may be simpler equipment. It has been observed that for certain applications (machine unloading) it was not necessary to have as many functions nor high precision.

In this way prices of 200,000 to 250,000 francs become feasible and it no longer seems impossible for a PME (small or medium enterprise) to recover the cost of such equipment. Three French projects will soon bear fruit:

Bertin Ingenierie Robotique is currently putting the finishing touches to a prototype for unloading an aluminum casting machine. It has hydraulic control and five motions directed by a programmable computer.

Same developments at Cetra, which has discovered an unexplored slot. General Manager Jean-Louis Boisseau explained: "Eighty percent of our work is in agribusiness, and the market has no equipment to solve the problems encountered in this field." Cetra has just formed an affiliate, Robotra, which will develop, by the end of 1981, a 4 to 5 axis robot for palletizing, loading, and unloading. This project was subsidized by public authorities which have just granted a loan of 7.5 million francs.

Finally, Acma is preparing for the first quarter of 1982, a 4 to 6 axis robot (capacity 8 kg), which would be offered at half the cost of large robots. A model adapted to arc welding will be exhibited in Essen next September.

There still remains the big market of the future: assembly. Some foreign manufacturers have nearly two years headstart on us, even if there is widespread talk of research and if projects are announced everywhere. At the industrial level, Renault in a few days will begin to use small robots to perform simple assembly operations: four models for secondary gearbox shaft installation at Cleon, and two for assembly of the half-axles for the new Model 142.

An auxiliary market which should not be overlooked is that of machine-environment for assembly machinery. For example there are problems to solve concerning parts feeding, orientation, and grasping of various components.

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CSO: 3102/337

SCIENCE POLICY

FRANCE: INTERVIEW WITH NEW MINISTER OF SCIENCE, TECHNOLOGY

Paris LE MONDE in French 30 Jun 81 p 24

[Interview with Jean-Pierre Chevenement, Minister of Research and Technology, by Maurice Arvonny and Jean-Francois Augereau; date and place not given]

[Text] A striking difference between the government of Mr Pierre Mauroy and the previous government lies in the existence of an important ministry for research and technology, whose chief, Mr Jean-Pierre Chevenement, also holds the rank of minister of state. This ministry's existence and the concomitant reduction of the direction of research by other ministries--in particular the Ministry of Industry--has led to serious conflicts of authority which have not yet been completely resolved.

But this principle has been established: research and technological development will basically have a single "boss" responsible for implementing the ambitious policy defined by Mr Mitterrand: increasing national spending for research-development to 2.5 percent of the gross domestic product (GDP) by 1985. In constant francs, it will be necessary to increase spending from 53 to 80 billion francs in 4 years, or an average increase of 11 percent per year.

This means that "a very rapid increase in budget expenditures" as well as various other resources will be required, in which connection Mr Chevenement's emphasis on expanding the nationalized sector will be maintained: the latter will be asked to "step up its effort" and banks, which "must do their job," will have to help innovative businesses.

In the interview which he granted LE MONDE, Mr Chevenement said that basic research and human and social sciences must again be awarded priority: following the example of what has been done in the case of atomic energy, oceanography and space exploration, he announced his intention to launch three major programs: biotechnologies, microelectronics and new energy sources. The minister noted other government goals in the area for which he is responsible, how to achieve them and how to better define and have them accepted by the national community through a "true democratic debate."

[Question] What is your concept of a minister of research? Won't the supervision which you will exercise over research agencies lead to conflicts with other members of the government?

[Answer] Any research policy implies simultaneously considering apparent short-term needs and some basic facts concerning the more distant future. This dual requirement can lead to two very different types of organization.

Proceeding on the basis of users' needs, the end result is a certain fragmentation, a certain excessive distribution of research agencies. This is the philosophy of the Rothschild Report in England.[1] Conversely, if preference is given to long-term needs, concern for protecting basic research, inasmuch as it provides the foundation for future technological and industrial advancements, if we intend to launch major stimulative programs along a certain number of avenues considered decisive for the long term, then we will be in favor of a more compact type of organization. This is what the Germans are doing with the BMFT.[2]

In France, we have moved from one concept to another in 10 years. The large ministry of state for scientific research and nuclear and space matters, which existed under General de Gaulle, was initially followed by the Ministry of Scientific and Industrial Development, that is, the Ministry of Industry absorbed the Ministry of Research in 1969. Then beginning in 1977, there was a state secretariat for interministerial coordination, which dried up in the course of the last few years, having been curtailed by the domination of both Mrs Alice Saunier-Seite and Mr Andre Giraud. And Francois Miterrand has rightly pointed out the shortcomings of the French research effort, as well as its excessive fragmentation. In my opinion, these two features are related. From the time that research was no longer defended at the government level, it no longer had the priority which it enjoyed from 1959 to 1969.

A ministry must therefore be built which will be an advocate of the future, to use the expression of the president of the republic. But that in no way implies severing relations between agencies and users, in particular the respective ministries. Consequently, if budget funds are to be allocated to the Ministry of Research and Technology so that it will have the supervisory means it needs to provide an impetus, to coordinate efforts and to bring together currently fragmented research centers, mechanisms for dual supervision, joint supervision or delegated supervision, unifying the field of technology and research as much as possible, must be set up.

[Question] Under these circumstances, for example, how will the responsibilities for nuclear energy and telecommunications be distributed?

[Answer] There are activities of the Atomic Energy Commission which concern national defense and which are not in question here. Its affiliates have very diverse industrial activities. Finally, in itself it constitutes a research and development agency. It will be necessary to find a type of organization to take this fact into account.

In the case of telecommunications, there are many agencies. There are the INRIA, ADI and CNET;[3] there are telecommunications firms that will become national corporations; there is CII [International Company for Data Processing]-Honeywell-Bull .... Coordination will therefore be necessary, which implies a reorganization of the technological and industrial development structure, a joint effort by the Ministry of Industry, the Ministry of Research and Technology and the Ministry of Economy and Finance. The general management of telecommunications must not remain an isolated fortress. Will this require integrating the CNET and the research effort which has been undertaken under the Ministry of PTT [Postal and Telecommunications Service] into the research package? That is a possibility.

Effort of Public Sector and Aid to Private Sector

[Question] What are the main features of the proposed 1982 budget? How can research expenditures representing 2.5 percent of the GDP be achieved by 1985?

[Answer] A very rapid increase in budget funding, in constant francs, is required for us to maintain the goal that has been set by the president of the republic: a research effort equivalent to 2.5 percent of the GDP by 1985. Roughly stated, this year our research expenditures are estimated at 53 billion in 1980 francs; we must increase this amount by 1985 to 80 billion in constant francs. Thus the problem is one of distributing these funds among the major constituents of French research. Basic and applied civilian research represents 13.5 billion francs; military research, 11 billion; major technological programs, 6.5 billion; industrial research, 22 billion. This industrial research will have to be maintained and expanded. It should be noted that these 22 billion francs include the research being conducted in currently nationalized corporations; that represents 5.6 billion. Then there is the nationalizable sector, or 7.2 billion; finally, there is the sector that will remain private, 9.2 billion. Let us say that the nationalized sector will be asked to increase its effort in proportions comparable to those of other sectors.

With regard to the private sector, it will require assistance and I intend to maintain and expand ANVAR's[4] policy for PMI [small and medium-size industries] (aid for innovation, bonuses for innovation, etc.), if only because it is better to prevent than to cure and because it is better to help French businesses to modernize themselves today than to put them under oxygen tents tomorrow.

I have also advanced the notion of reduced-interest loans to help businesses expand their research efforts. In fact, the credit policy for innovative firms must be revised. Banks must do their job. The tax exemptions recommended by the Fauroux Report would be too expensive, too comprehensive and would probably not be effective.

More generally, a close relationship must be established between research in major public laboratories and industrial research. I believe that political conditions today are favorable for implementing this policy on the scale desired.

Including the National Community

[Question] And what about the recruitment of researchers?

[Answer] The government intends to ask parliament to create at least 525 positions, including 200 for researchers. In their case, that would represent an increase of about 4 percent this year and would be the highest figure recorded since 1969. Moreover, a major compensation effort is required for the recruitment of ITA's (engineers, technicians, administrators). But extremes must be avoided: by implementing a recruitment policy that will make it possible to update our laboratories without conducting mass recruitment which would later be followed by layoffs.

[Question] How will the long-range appropriations bill be prepared? And will there be priority features?

[Answer] With the former government, we never knew what the real priorities were. There were some priorities in the 10-year plan, in CODIS [Advisory Committee for Strategic Industries] considerations and in the Eighth Plan. No one knew which way to turn anymore. All of that must be considered from a reasonable standpoint.

An important effort must be made in the areas of biotechnology, microelectronics and new sources of energy. I am not talking about basic research or human and social sciences. Those are priorities which must be reestablished. But in order to launch major new programs combining research and technology, it is important to have research agencies work together; I will periodically hold meetings with their leading officials. Then we will see what institutional results that will produce. We should do something similar, mutatis mutandis, to what was done in the case of atomic energy at the time of the Liberation and in the 1960's in the case of oceanography and space research.

As for the preparation of the long-range appropriations bill, I want to organize a major conference after the summer vacation so that researchers as well as trade unions and major representatives of public opinion will be included in defining the main features of a research policy.

One concern of the coming period is that the responsibility for problems of scientific research and technological development will be fully assumed by the national community. For this reason, I attach the greatest importance to scientific and technical data, which in my opinion should alone constitute a whole item of the appropriations bill: but the appropriations bill cannot be submitted to parliament in the fall session. The bill should be prepared carefully and as democratically as possible. I believe that it could be submitted in the spring session. Such an approach means that the conference would be held in the fall. It will be preceded by regional meetings, in conjunction with regional public establishments. There are regional centers of development that must be strengthened. The conference will have to establish certain guidelines, specifically in the areas of scientific employment, scientific data, international cooperation, etc.

Trade unions, businesses and consumers must be included in defining scientific policy. The important thing is to get the full range of public opinion "into it." A special effort must therefore be made for schools themselves, in terms of curricula and books, at the level of training and, of course, television and the press. The Hall of Discovery and the future museum of science and technology of La Villette will have to make a contribution to this policy, as will small provincial branches of those agencies.

Neither Scientism Nor Obscurantism

[Question] How can the concerns and outlook of research be included in the establishment of industrial policy?

[Answer] That is a very important problem, a problem of our administration in the area of scientific, technological and industrial policy. It appears that it will be difficult to keep CODIS as it is, but it can be transformed. An agency is needed that will closely combine the choices of technological development and the choices of industrial reorganization--specifically by expanding the public sector.

These choices must be related. A committee for technological development and industrial reorganization would be helpful, so that the principal ministries involved in making these choices could express their opinions and coordinate their actions.

Your question could be given a more political answer. We have established the political and social conditions for much better relations between the world of research and the world of business. Expansion of the public sector, revision of the plan and the existence of a leftist government and majority should make it possible to consider these problems from a new perspective.

[Question] What means can be used to assure the "clarity" and control of the use of public assistance for research?

[Answer] The opacity which formerly existed was excessive. No evaluation was made, either in the government or elsewhere, of the efficiency and trends of public programs for research. One of our concerns, voiced by Francois Miterrand, is therefore to provide parliament with an agency for evaluating technological choices. In my opinion, it should be a light structure that will use consultants from within the government, from outside the government or even from abroad. The important thing is for parliament to be able to have reports on all matters with which it is concerned, but reports which are not necessarily provided by the government, which risks looking like judge and jury in this case. I do not promise such action from an "antiscience" standpoint. Questions of scientific responsibility should be posed as clearly as possible. This is the best way of really getting the country involved in the advancement of knowledge and making France a nation ahead of its time. France does not need a resurgence of scientism, nor the advent of a new obscurantism. It does need a true democratic debate.

FOOTNOTES

1. Editor's Note--Submitted to the British Parliament in 1971, the "Rothschild Report" was used as a basis for a thorough reform of the research establishment.

2 Editor's Note--Federal Ministry for Research and Technology.

3. Editor's Note--National Institute for Research in Data Processing and Automation, Agency for the Development of Data Processing, National Center for Telecommunications Studies.

4. Editor's Note--National Agency for Valorization of Research.

11915
CSO: 3102/328

A-320 TECHNICAL INNOVATIONS DISCUSSED

Paris AVIATION MAGAZINE INTERNATIONAL in French 15 Jul 81 pp 30-31

[Article: "Airbus Industrie: Ambitious Objectives of the A-320"]

[Text] Two days after Bernard Fathiere had announced the priority being given to the A-320 project, Roger Beteille, general manager of Airbus Industrie, made the first technical presentation of the airplane with the obvious purpose of showing the manufacturer's lead over possible competitors in defining the airplane.

The project is far from being set, especially considering Airbus Industrie's desire to incorporate in the A-320 all the latest, and proven, technical developments capable of increasing its advantages over the preceding generation of short and medium range 150-170 seat transports, that is, the generation of the Boeing 727.

The objectives which have been fixed are ambitious, justifying study of a completely new airplane: 40 percent less total fuel consumption, 40 percent less consumption per seat, and operating costs 20 to 25 percent lower than those of the Boeing 727. This economic performance corresponds to a gain of 30 to 35 percent in consumption per seat and 18 to 20 percent in operating costs in comparison with the Boeing 737-200.

To achieve these objectives, to which should be added increased comfort and greater facility of operation, Airbus Industrie is counting, essentially, upon three key elements:

--New generation engines in the 25,000 lb (11,340 kg) thrust class: CFM 56-2000, RJ 500-35, and PW 2025;

--An airframe incorporating the very latest research in aerodynamics (wings), structures (composite parts), and electronics (active control); and

--A fuselage section, slightly bilobed, higher than those of the present Boeing 707/727/737/757 family.

Despite all the innovations, having as much as possible in common with the A-310 is one of the objectives (in particular, at the systems level).

The result of these decisions is a twin-jet of conventional appearance, with low wings and engines in nacelle under the wings, of which two versions are planned: the A-320-100 with 154 seats uniformly arranged with 32-inch spacing and the A-320-200 with 172 seats arranged the same way. The two versions differ only in fuselage length, 3.30 meters greater for the A-320-200. The 320 will have a range varying from 3,000 to 4,000 km, depending upon the version.

The wings whose design is benefiting from the experience gained with the A-300 and A-310 are to be 9.5 meters long, with surface of 125.8 square meters, and swept back 25°. Their thickness/chord ratio varies from 15 to 10.8 percent. The active control planned from the beginning will be introduced only after some time, when the aeroelastic characteristics of the wings are well understood.

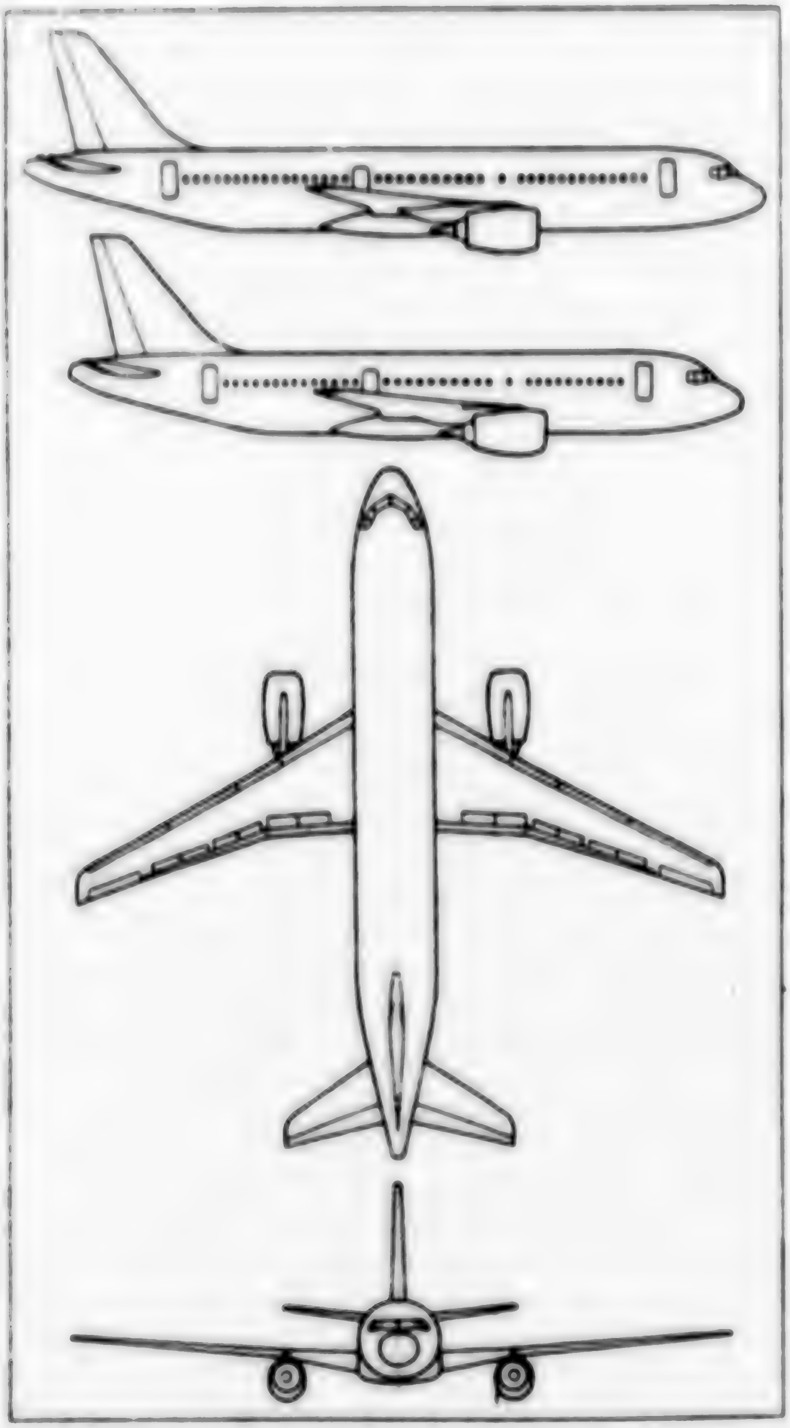
The other key element, the engines, has been the subject of numerous commentaries (see "Questions to..." in our preceding issue, p 19). Evidently the first engine to be ready will be the DFM 56-2000 but the airlines will play a decisive role. "The choice of internal and external thermodynamic characteristics depend upon the operating conditions; it is for the airlines to choose," we are told at Airbus Industrie. To a certain extent the airlines will also have their say about the schedule. They can choose either to have the airplane available, as soon as possible, at the price of some concession at the level of engine performance, or to wait to obtain airplanes equipped with engines of greater efficiency, a wait which could broaden the competition among engine manufacturers.

Particular attention has been devoted to study of the fuselage and its arrangement. The slightly bilobed section makes it possible to obtain both good cabin passenger accommodation and provide a compartment capable of accepting standard LD3 containers, and above all, adapted to the requirements for simplified handling which is stressed today.

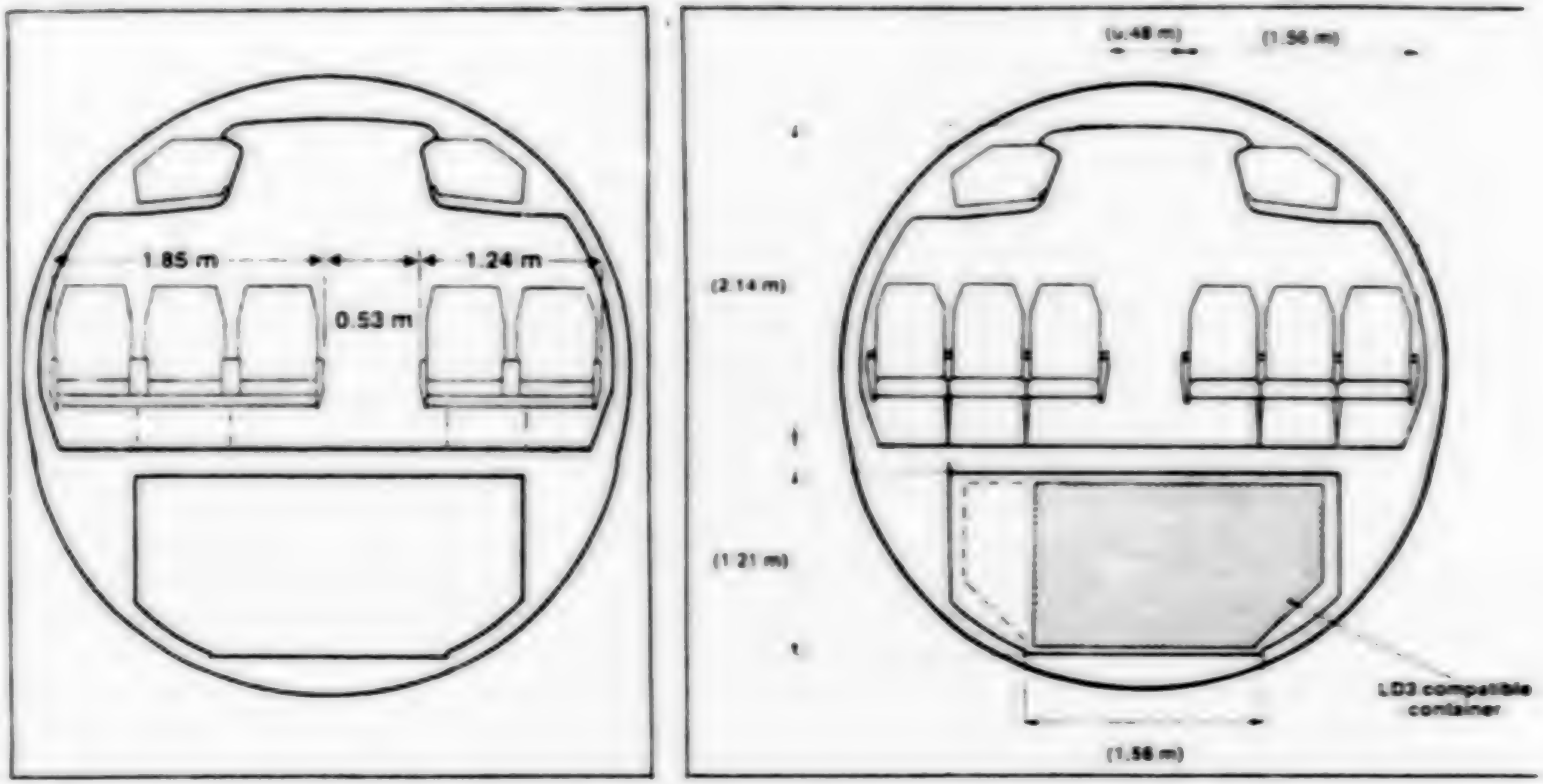
The cockpit without question is planned for a crew of two pilots. It retains the instrumentation and main characteristics of the FFCC [Forward-Facing Crew Cockpit] of the Airbus A-310 and A-300-600.

If started before the end of the year the A-320 can be placed in service for the 1986 season. Development should take 4-1/2 years, with first flight 3 years and 4 months after start-up, and certification about 12 months later.

It is too soon to talk about price, but as an indication the figure of $20 million has been mentioned; here, too, the market will have its say.

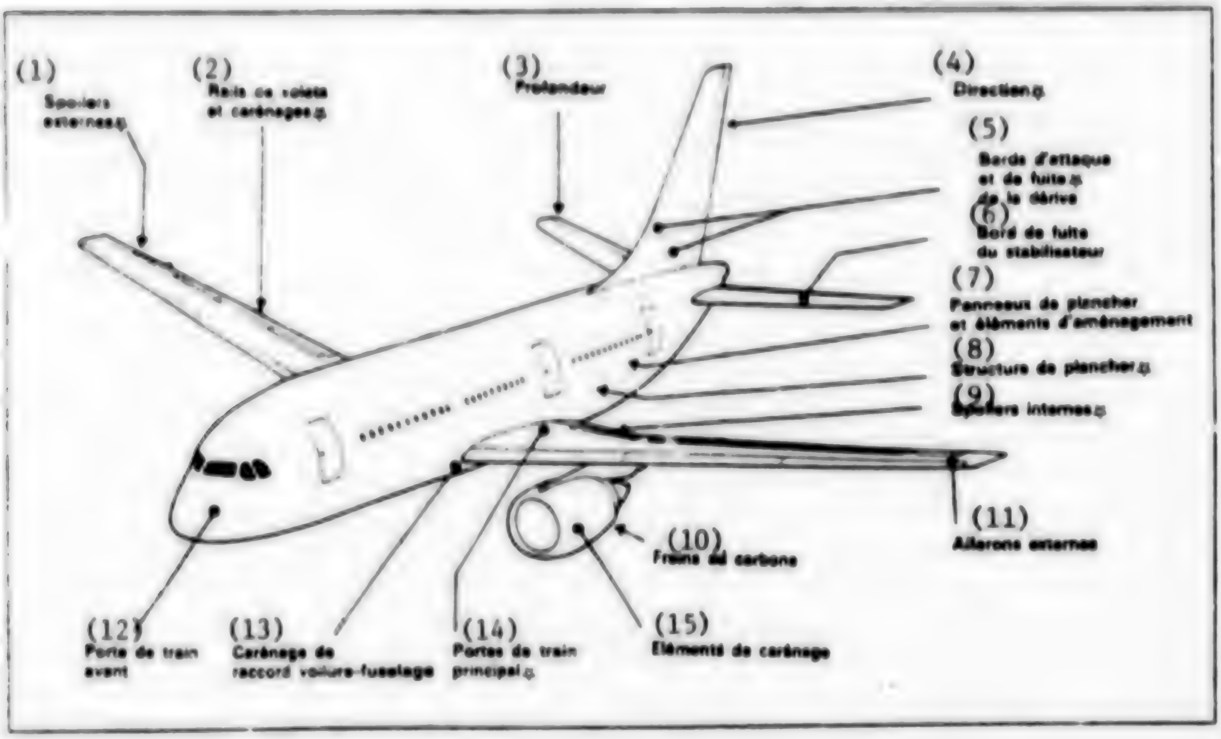


Two versions of the future Airbus A-320 are planned: the -100, 36.04 meters long, shown in three views above, and an elongated -200 version, with fuselage 39.24 meters long, of which a profile view is shown at the top.



The bilobed fuselage of the A-320 makes possible improved passenger comfort and provides greater space for baggage beneath the seats. Special attention has been devoted to the "business class" arrangement with five seats abreast which, it seems, will supplant "first" class.

Wide utilization of composite materials will be made in construction of the A-320. Indicated on this diagram are the composite parts (Kevlar, carbon, etc.). The parts marked with an asterisk are derived directly from experience with the A-300.


(1)
Spoilers externes*
(2)
Rails de volets et carénages*
(3)
Profondeur
(4)
Direction*
(5)
Bords d'attaque et de fuite* de la dérive
(6)
Bord de fuite du stabilisateur
(7)
Panneaux de plancher et éléments d'aménagement
(8)
Structure de plancher*
(9)
Spoilers internes*
(10)
Freins de carbone
(11)
Ailerons externes
(12)
Porte de train avant
(13)
Carénage de raccord voilure-fuselage
(14)
Portes de train principal*
(15)
Eléments de carénage

Key:

(1) Outboard spoilers
(2) Flap and fairing rails
(3) Elevator
(4) Rudder
(5) Leading edge and trailing edge of vertical stabilizer
(6) Stabilizer trailing edge
(7) Floor panels and fitting out parts
(8) Floor structure
(9) Inboard spoilers
(10) Carbon brakes
(11) Outboard ailerons
(12) Nose gear door
(13) Wing to fuselage connection fairing
(14) Main landing gear door
(15) Fairing elements

Characteristics of the Airbus A-320

Item	A-320-100	A-320-200
Span, meters	34.57	34.57
Length, meters	36.04	39.24
Height, meters	11.85	11.85
Maximum take-off weight, kg	66,000	71,900
Maximum landing weight, kg	60,700	65,700
Maximum weight without fuel, kg	54,900	60,400
Maximum empty operating weight, kg	38,748	40,835
Maximum payload, kg	16,422	19,565
Number of seats (spaced 32 inches)	154	172
Loading: passengers and baggage, kg	13,971	15,604
Additional cargo, kg	2,451	3,961
Cargo compartment volumes, cubic meters		
forward	13.6	18.3
aft	25.1	29.9
total	38.7	48.3 [sic]
Maximum fuel weight, kg	18.800	18,800

11,706
CSO: 8119/1510

NEW COMMUTER AIRLINERS EXHIBITED AT LE BOURGET

Paris AVIATION MAGAZINE INTERNATIONAL in French 1-14 Jul 81 pp 24-29

[Article: "Salon: First Report"]

[Excerpts] The 1981 Le Bourget Salon was good despite French election uncertainties. In total it drew some 800 exhibitors and the organizers counted 577,300 visitors, of whom 103,300 were in the industry, including 23,000 from foreign countries. Never before had there been so many exhibitors nor so many people.

From year to year the organizers strive to improve the Salon. This time, separation of the public anxious to see the exhibits as close up as possible and the professionals legitimately desiring to remain with them was very noticeably improved. On the other hand vehicles presented a problem in that expansion of the parking lots in front of the rows of Kiosks broke up the view of the runways. Last--and this is the price of success--increased distances between the Kiosks and exhibit halls ended up in loss of time, of which some complained. But it is only a matter of minor details. Considering the difficulty of reconciling the conflicting constraints which the organizers had to face, Le Bourget was more than ever a model of success.

At the technical level, even more so than two years ago, it was apparent that even though the aircraft and engine manufacturers, masters of their technologies, are working to improve the performance of their products in the absence of technological breakthroughs which would enable them to surpass present limitations distinctly, the equipment industry, in contrast, is making progress with great strides, thanks to a number of new techniques. There a plateau is very far from being reached, and it is in those directions thus opened that it must turn its glances for the decade now begun.

Commercial Aircraft

Airbus Industrie: Concrete Proposals

The board of directors of the European consortium has authorized proposals for the two versions of the A-320 (134 and 160 seats) to Airline Companies, with firm prices, specific delivery dates, and guaranteed performance. This caused Bernard Lathiere, managing director of Airbus Industrie, to say that "The A-320 has indeed been started...providing customers can be found," a statement given validity soon after with Air France entering the ranks. In contrast, rumors to the effect that Air Inter is ready to do likewise have been denied the domestic airline, which depends more upon routes with heavy traffic (and because of that, upon the A-300), indicating that it will have no need for the 150-seat class before 1990. Division of work upon the new member of the Airbus family has not yet been fixed. At any rate it can be assumed that France and Great Britain will be the major partners, that West Germany will be content with a somewhat smaller part, and that Italy may join the operation as a full partner, perhaps with a 10-percent share. Last, what is even more astonishing, General Dynamics is interested in the program and may participate for up to 18 or 19 percent if an agreement is concluded, but negotiations are only in a very preliminary stage.

The cost of development and production of the A-320 will amount to nearly $2 billion (1981 value). Airbus Industrie has therefore given priority attention to the three projects planned at the same time (the other two being the elongated twin-jet TA-9 and the four-jet long range transport TA-11). But a new designation has also made its first appearance: the TA-12. This is a projected twin-jet very long range transport which may be of interest in Africa and South America in particular, that is, where networks do not include long flights over oceans. At Airbus Industrie, as at American competitors, despite the importance of the potential market opening for the "150-seaters" (2,800 airplanes in toto over the long term) all are agreed in saying that there will be a genuine place for only two airplanes of the same class. Lathiere predicts it will be Airbus Industrie and Boeing.

The MDF-100: Start-up In a Few Months?

Will the McDonnell Douglas and Fokker MDF-100 be closer to the projected DC-XX, formerly the ATMR, than the proposed F-28 and F-29? Certainly there is no answer to that question, since the signatures of the two partners on the formal agreement are scarcely a few weeks old. The only official comment, which is the same as what is heard from the other market contenders: the market will decide. The MDF-100, which will have the benefit of two final assembly lines, one at Long Beach, the other at Schipol, based upon a strictly equal partnership which leaves the door open for other partners (Japan, of course, is mentioned here as elsewhere) could be delivered starting in 1986, especially in the event of actual start-up in the next few months. According to the accepted formula the green light depends upon the nature of the initial customers more than upon the number of orders. Is not the 150-seat model, suddenly very much in fashion, linked to a certain extent to the disastrous consequences of the commercial recession which is running through the air transport industry? The question is implicitly posed by some but McDonnell Douglas and Fokker are indeed responding in their own way by at present providing for two versions, complementary from the standpoint of capacity. But nothing further has been specified. As far as financing is concerned, it seems that Fokker is assured of obtaining guarantees of 1 billion florins from the Dutch government, which is, however, less than half of the investment to be taken into account. The record needs more elaboration.

The Shorts 360 Wins the Speed Competition

Having made its first flight six months ahead of the previously announced schedule, it was possible for the Shorts 360 to be shown, even though not foreseen.

Certification is planned for the end of next year, that is, as the Irish company emphasizes, two years ahead of most of the known competitors. Fifteen firm orders have been placed up to the present and the initial production rate will be one airplane per month to begin, and one and a half later. In the meantime Shorts is continuing to exert great marketing effort for the 330, of which 80 have now been ordered and whose production rate is going to be increased to three airplanes per month.

First Deliveries of Domier DO-228 in December

On next 17 October, based upon a typically German rigorous schedule, the Domier DO-228 will receive its airworthiness certificate at the completion of a program effected with two airplanes and, for certain special phases, with the experimental TNT (new wing technology) airplane. The first production airplane will be delivered in December to Flyservice in Norway and the production rate will increase progressively to three or four per month, perhaps even more. Up to now Domier has obtained 21 firm orders to which there should be added numerous options (50). Working painstakingly, and one step at a time, the German manufacturer is now concentrating its marketing efforts in Europe, Africa, and Asia, curiously putting off penetration of the United States until later, which is planned without association with a local firm.

The Fokker F-XX in 10 Years

Without doubt the F-27 will reach the end of its career in a dozen years. Its successor is already under study even though the next generation turboprops contemplated for a F-XX of 90-100 seats are not yet available. A task force, working within the study office and marketing services of Fokker, is preparing to submit its first conclusions to the management but there is little likelihood that this new airplane will make its appearance before 1990.

Saab-Fairchild: 101 Sales for the 340

A little less than a year after the decision to start the SF-340 and a little more than a year before the prototype comes out of the shop (November 1982) the sales book for it already boasts 101 soles, half the production necessary to reach the break even point (200 units). First deliveries are still planned for 1984. The production rate will thus reach six airplanes per month.

The companies have also decided to adopt an improved version of the General Electric CT-7 turboprop which had been chosen at the beginning. It is the CT-5A of 1,675 horsepower which is to be flight tested next year. Saab and Fairchild have also selected an autopilot system and an avionics system made by the Collins General Aviation Division of Rockwell International. The wind tunnel tests of mock-ups of the 340 are coming to an end, a full-size engineering mock-up has been built, and ground tests of various subsystems have commenced. The new final assembly plant at Linkoping is under construction. Saab will manufacture the fuselage which Fairchild will produce the wings, nacelles, and tail units. The orders represent some $450 million and come from 20 countries on all continents except Africa. A quarter of the 100 airplanes ordered is for "executive" versions. The first flight is still planned for December 1982.

Aerospatiale/Aeritalia ATR-42: Start-up at the End of October?

The ATR-42 regional transport 42-seat airplane program is approaching the moment of truth. Mr. Etasse, director of the "Aircraft" division of Aerospatiale, has announced that the decision to start the program should be made at the end of October (plus or minus a few days).

Marketing was vigorously commenced in the beginning of June on the basis of a decision then made. A few days later 15 of the 25 airlines which had expressed interest in the ATR-42 already asked to sign options and some paid deposits. "We have practically sold 40 airplanes," Etasse said, which is the production for the years 1985 and 1986. Two of the three leading American commuter airlines are said to be among those who signed.

Technical specification has taken a new step forward with selection of the engines: Pratt and Whitney Canada will supply the PW 100 (formerly the PT 7).

Start-up of the program remains suspended until financing is decided. The total cost of the operation is estimated at about 1 billion francs (1981). The French and Italian shares are said to be on the order of 40 percent (a third partner yet to be found is desired): for France this represents an investment of from 400 to 500 million francs spread over four to five years, an amount judged affordable even when the amounts that France will have to invest in the A-320 are taken into account. The market response to the Aerospatiale and Aeritalia proposals will play a capital role in the decision to start the operation or not. The worldwide market is estimated at 3,700 airplanes by the program officials who expect to sell about 1,000 ATR-42 airplanes.

The "Aircraft" division of Aerospatiale sees, in the ATR-42, a just foothold in a very large market which is being pressed upon from all sides, that for large twin turboprops ranging from 90 to 100 seats; first, in the 1980 decade with the modern turboprop/propeller configuration, and then, in the next decade, with the "propfan" configuration.

11706
CSO: 3102/340

TRANSPORTATION

MODULAR-ENGINE CAR SAVES 20 PERCENT FUEL

Rome L'UNITA in Italian 8 Jun 81 p 7

[Article: "The Modular-Engine Car Saves 20 Percent"]

> [Text] The method chosen by the technicians of Alfa--System Undergoing Practical Experimentation on 10 Taxis in Use in Milan

For a week now, anyone who happens to take a taxi in Milan may find himself getting into a "modular"-engine vehicle. These taxis are easily recognizable, because it is rather rare for taxi operators to be using Alfette 2.0 LI's in the "America" version; but even those who are not capable of telling one model of automobile from another will quickly perceive that they are traveling in a prototype. When the taxi is moving, they will indeed note those slight jerks typical of cars with automatic transmission, even though these taxis are supplied with a normal 5-speed mechanical transmission.

For a week, a real-life test of the effectiveness of an approach being tried out by Alfa Romeo to save fuel by using a normal 4-cylinder engine but with modular functioning has been under way. What happens in practice is that when little power is required, a small electronic plant suspends, automatically and alternately, the functioning of two of the engine's four cylinders. One thus achieves a fuel saving estimated at 20 percent (half of that amount because of electronic fuel injection and half because of the "modularity"), to be measured precisely when the modular-engine taxis (10 in all, assigned to one taxi-operators' cooperative) have run up 15,000 km under normal use conditions.

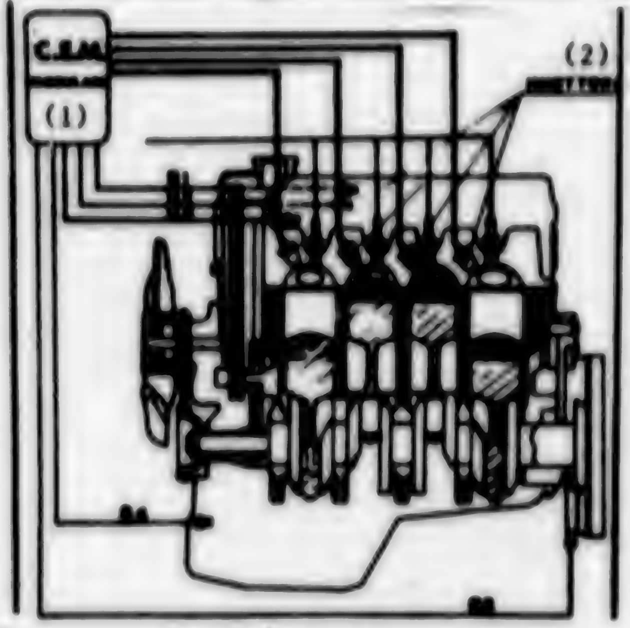
The Alfa prototypes have been built within the framework of the "Purpose-Directed Energy Project" of the CNR [National Research Council] at a cost of 200 million lire, 40 percent of it covered by the EEC.

In practice, the project designers were able to work on three formulas for optimizing fuel demand by varying the number of active cycles in the time unit, but keeping the same RPM and--more importantly--keeping efficiencies close to the maximum obtainable.

As the Alfa technicians stated during the presentation of the 10 vehicles to the press, the three ways of deactivating some cycles of the modular engine are:

(1) interruption of fuel flow to one or more cylinders for one or more cycles; this is partialization of the fuel;

Diagram of Modular Engine with Electronic Control



Key: 1. Modular CEM 2. Injectors

Legend:

CEM: Microprocessor Electronic Engine Control
S1, S2, S3, S4, S5: sensors for regulation of throttle angle, air temperature, water temperature, oil temperature, timing and engine RPM
The sensors register the load conditions and in function of the power demand, the microprocessor provides for injection of fuel into only two cylinders or all four.

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(2) interruption of the flow of the air-fuel mixture to the cylinder, with closing of the intake and exhaust valves; this is partialization of the charge;

(3) division of the engine block into two distinct semiblocks, with separate or simultaneous use as the need arises; this is partialization of cubic capacity.

These are three different approaches to solution of the same problem, but they present an extremely different degree of design complexity (in increasing order of presentation), and they also lead to different theortetical results (increase of efficiency and therefore saving of fuel: these too increase with the order of presentation).

For example, partialization of cubic capacity, which is the most difficult for practical construction, is at the same time the solution that makes it possible to eliminate almost all the work losses connected with the inactive-cylinder group, and this obviously makes for high energy-saving. On the other hand, partialization of the charge appears easier to achieve. In this case, though, the losses due to the mechanical friction of the inactive cylinders subtract from total efficiency, but the work of pumping the intake air is eliminated.

From these considerations it follows that fuel partialization is the solution which, though offering lower efficiency than the other two, nonetheless requires no substantial variation of the existing mechanics. In this case, the efficiency losses are due to mechanical friction and to pumping of air.

Alfa Romeo has chosen this last-named solution, which, though not the one that permits greatest saving of fuel, is easily adaptable to the growing number of cars equipped with electronic fuel-injection, and it is especially well-adapted to electronic control and thus permits fast and frequent changes from normal operation to partialization and vice-versa; these characteristics increase the possibility that the system will make an effective contribution to energy-saving.

This choice should not be a surprising one. "First of all," the Alfa technicians stress, "a matter of priority is involved here, in the sense that Alfa Romeo has certainly not, by this choice, abandoned research in the field of charge partialization (whereas, for reasons of cost, the third approach--cubic-capacity partialization--has been ruled out for the time being). As is always the case when one explores new pathways, targets have been set in this case too. The main one has been to achieve a vehicle capable of running on only two active cylinders when that is what the conditions call for, with automatic changeover to four cylinders when higher power demands arise."

This is provided for, as was mentioned, by a small electronic plant, developed by the Alfa Romeo technicians, the purpose of which is to determine whether two or four cylinders should be in operation, depending on the power demand.

The diagram and legend above give a good idea of the manner of functioning of the modular engine adopted for the 10 taxis in use on the streets of Milan.

11267
CSO: 3102/811

TRANSPORTATION

PLASTIC AUTO COMPONENTS EXHIBITED AT SWISS SHOW

Paris L'USINE NOUVELLE in French 4 Jun 81 pp 110-111

[Article by Daniel Coue: "Soon Twice as Much Plastic"]

> [Text] For lower fuel consumption, the auto industry should continue to seek weight reductions. At the VIIIth International Vehicle Industry Suppliers Show (Sitev), which was held in Geneva in mid-May, plastics were the celebrities. But magnesium, wood-resin composites, and steel also received their share of the attention.

"The weight of plastics inthe automobile will double in the near future, particularly in body parts." This plastics processing company has just installed BMC [bulk molding compound] equipment for injection molding of filled polyester to form parts with large surface areas.

For Jean-Marc Manducher, commercial director of Manducher SA, this prediction is not a pipe dream. The same prognosis is given by those at SMTP Billion, a company which in recent months has begun working with the ZMC process, intended for the same purposes. Bernard Monnet, director of the injection department of this affiliate of Saint-Gobain, thinks that this method should rapidly help clear the way for utilization of reinforced polyesters, since the method offers the hope of lowering the overall cost by 30 percent. The parts have not only a better appearance, but a good homogeneity and an increased regularity of weight. If the rumors are to be believed, within a year or so some vehicles will have chassis parts made of polyester.

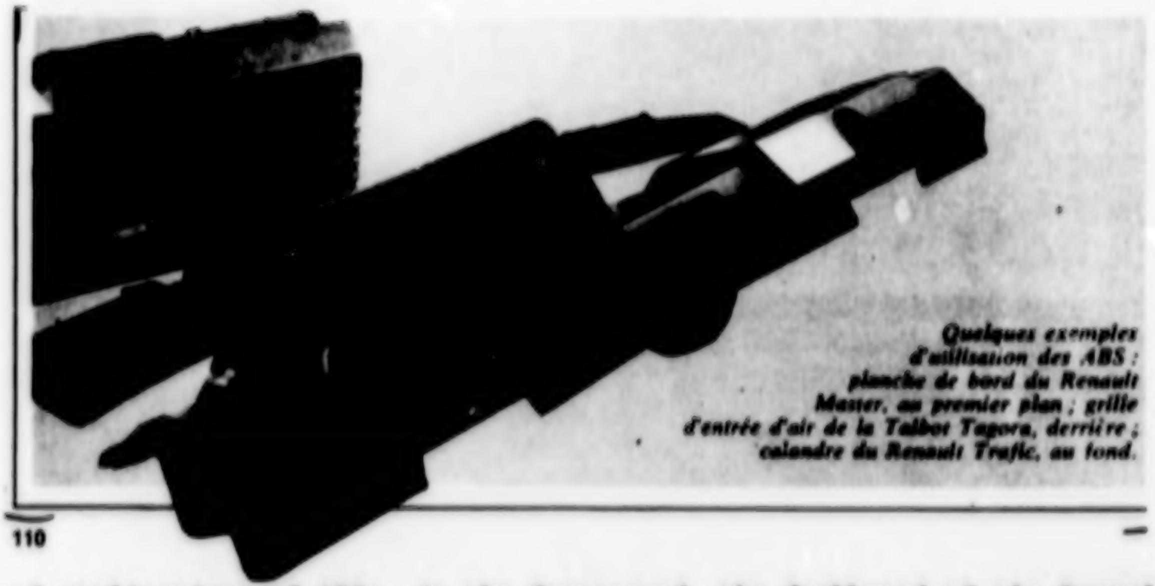
In fact, according to Jean-Yves Dutour, spokesman for the engineering plastics development group at Du Pont de Nemours Europe, "The European automakers essentially should turn to plastics for three reasons: the reduction in cost price, the prevention of corrosion, and the freedom of style. Weight reduction remains relatively secondary, contrary to what is happening in the United States." Also, there is evidence that in some cases the presently used SMC [sheet molding compound] will give place to injectable thermoplastics capable of being painted and tolerating oven temperatures (140° to 170°C).

In practice, two types of products are suitable candidates, the polyesters and the polyamides. Formulations, moreover, are continually evolving in the direction of increased suitability for injection. Two examples are the Ugikapon polyester resins from PCUK (Produits Chimiques Ugine-Kuhlmann) and Techster, a new product in the polyester family, offered by Rhone-Poulenc. The latter possesses some properties close to those of polyamides, while exhibiting improved moisture, aging, and temperature resistance, as well as better electrical characteristics and dimensional stability. Jean Dubois, spokesman for the automobile market division at Rhone-Poulenc, has faith in the polyamides because of their lightness: "Obviously, everything comes down to the configurations, customer specifications, and economic constraints." The same opinion was expressed by those at the Monsanto stand, where the display included a prototype fender made in the United States for Pontiac; the panel is made of filled polyamide copolymer molded by the RIM method (reaction injection molding), similar to the method used for polyurethane.

The polycarbonate specialists are not ready to be counted out yet. General Electric Polastics, showing its new CL 100 resin, a modified polycarbonate offering good paintability and excellent impact resistance and resistance to hydrocarbons, is already back in the fray. Another rumor has it that some models will soon be equipped with rear quarter window panels made of transparent polycarbonate.

Other materials are making a notable comeback: EPDM [ethylene-propylene terpolymer] for lower front cowlings and wheel boxes presently in development (among other things, a restyling of the Citroen CX is being considered!), and ABS [acrylonitrile-butadiene-styrene resin]. PCUK presented its new ABS (Ugikral TNX A), featuring resistance to temperatures in the 105 to 120°C range, better opportunities for coloration, greater ease of processing, etc. It has already been approved for the dashboard of the new Renault, which in 4 months will replace the previous R 12. "And why not bodies made of ABS?" suggests Roland Tabuis of PCUK. "It is an idea which in the long run should prove feasible if the development of polyurethane paint systems is successful." Meanwhile, ABS finds use in exterior appearance parts (air vent louver of the Talbot Tagora, radiator grille of the Renault Trafic, etc.) or interior parts (trunk well of the Renault Fuego, dashboard of the Renault Master, etc.).

In this field, new materials and developments are legion. They include Monsanto's "Fome Cor," a foam complex of expanded polystyrene on cardboard with a decorative skin of PVC or polyurethane, and also fabric and rubber padding and molded wood panels. "This type of material still remains slightly more costly than injected plastics," points out Dominique Gauvin, marketing specialist at Tramico Model-Bozel. "But it is more profitable to use on limited-edition models." The same outlook was indicated by representatives from Sunwind AB (Sweden), which displayed some door panels, dashboard inserts, and rear window shelves made of Lignotock. On the other hand, Philippe Galey, head of the automobile division of Griffine Marechal, predicts for these elements a growing utilization of panels made of "wood stock," a hot-stampable material (50 percent wood flour and 50 percent polypropylene). "The trend is toward single-operation forming, punching, trimming, and attachment of inserts. We have perfected, to our satisfaction, a method which even allows recovery of cuttings in the course of thermoforming." Another war-horse for Griffine Marechal, vinyl, could return to its old prominence by virtue of the "electroform" process, which gives it the look and feel of fabric.



Quelques exemples d'utilisation des ABS : planche de bord du Renault Master, au premier plan ; grille d'entrée d'air de la Talbot Tagora, derrière ; calandre du Renault Trafic, au fond.

Examples of applications of ABS: in the foreground, the dashboard of the Renault Master; behind it, the air vent louver of the Talbot Tagora; in the background, the radiator grille of the Renault Trafic.

Getting back to plastics, their use was evident in the domain of mechanical parts: windshield wiper bridges, electronic ignition boxes, window-regulator controls, and carburetor bodies made of mineral-filled polyamide; timing chain cases and housings; fan mounts made of polyamide or polyester; dashboard structures made of acetal resin. Rhone-Poulenc also displayed pistons and timing gears made of polyimide, and Du Pont exhibited polyimide fan and distributor bearings. Other innovations have been announced by Du Pont: after having been used for clutch linings, aramid fibers are now being embedded in compressed flat gaskets.

Two prototype pistons made of polyimide (Rhone-Poulenc) for diesel and gasoline engines being studied by Polymotor Research.

Magnesium had fallen into disuse, yet it is hardly any heavier than plastic, is three and a half times lighter than Zamak for equal strength, and can be molded very easily on the same presses. The automakers now seem to have rediscovered it. Several models are presently equipped with magnesium carburetors, and other new parts are in development: alternator fans, starter housings, seat cables, parabolic reflectors of headlamps, cylinder head covers, etc. "The interest in this metal arose primarily when it became possible to simplify the machining as a consequence of better molding precision," explains Ginette Dourlet, sales executive at Societe eveyronnaise de metallurgy [Aveyron Metallurgy Company] (Valeo group). "Also, we have perfected a cataphoretic coating process that makes the parts entirely resistant to corrosion by salt sprays and methanol." This process will be applied industrially for the first time on an injection rail for a diesel engine to be turned over to a major French manufacturer for trials.

The trend toward integration of several functions into a single component was illustrated on the SKF stand by the world premiere showing of a propeller shaft bearing for a rear wheel drive vehicle. Combining the functions of bearing and mounting, it carries a vibration absorber ring made of molded synthetic rubber between the bearing and the mounting frame. It will soon be installed on the Fiat 131 and 132. For the automaker the main advantage of this type of combination is that it can permit appreciable gains in productivity on the assembly line. Such a design also serves to reduce the weight of the vehicle.

Transmission propeller shaft for a rear wheel drive vehicle (SKF). It carries a vibration absorber ring made of molded synthetic rubber between the bearing and the mounting frame.

Many of the new technologies have appeared in response to economic pressures: a good illustration is the present wave of cold or semi-hot extrusion for low- and medium-carbon mass-produced parts. "This technology can mean a curtailment of finishing operations as well as an increase in the mechanical durability of the components," points out Giovanni Destefanis, research engineer at Teksid (Fiat group). "It also permits an often spectacular savings of material." Thus, the extrusion of a "synchro" pinion hub, previously machined from blanks, has saved 1 kg of cuttings per part. Today, only 0.55 kg of metal stock is required for a pinion with a finished weight of 0.50 kg. For two months the extrusion of wheel hubs for the Fiat 131 and 132 and planetary gearing of differentials for the Fiat Ritmo, Pamela 127, and Autobianchi A 112 has also reduced the total manufacturing cycle times by 1.3 and 1 minute per piece, respectively.

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TRANSPORTATION

BRIEFS

YUGOSLAV AIRBUS SUBCONTRACTS--A cooperation agreement between Airbus Industrie and SOKO (of Yugoslavia) has been signed. In accordance with the terms of this long term cooperation agreement it is contemplated that the present partners of Airbus Industrie will subcontract a portion of the work on the A-300 and A-310 programs and future programs developed within the GIE [economic interest group] to SAKO upon the condition that competitive business and manufacturing proposals be made by the Yugoslav industry. (SOKO, which represents the Yugoslav aeronautical manufacturers, will in addition be responsible for management and coordination of the activities of that country's enterprises within the scope of cooperation with Airbus Industrie). Further, Airbus Industrie is proposing to SOKO that it participate in the manufacture of new aircraft, which should commence during the 1980 decade. [Text] [Paris AVIATION MAGAZINE INTERNATIONAL in French 1 Jul 81 p 15] 11706

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